Current sensorless control of a PMDC motor using Kalman filter and cascaded PID controller

Abstract

This paper proposes a permanent magnet direct current (PMDC) motor position control under armature current limitation due to different factors like motor driver limitation, motor winding current limitation, etc. To limit the armature current, it has to be measured. However, adding a current sensor might not be the best solution. Here, the Kalman filter was used to estimate the armature current. To overcome the current limitation, cascaded PID controller was proposed and by only using integral term in the current controller, the current can be reduced by significant amount. Simulations for the Kalman filter and the cascaded PID controller has been done and presented.